inquiry into the nature of its principle of individuation. Such an inquire becomes "*psychology*" in the widest and in the original signification of that term—it is the psychology of Aristotle.

Mr. Herbert Spencer has already made a great step towards reverting to this original use of the term, for he has made his "psychology" conterminous with the animal kingdom, having made it a history of the psychoses of animals. But the activities of plants must not be ignored. A science which should include the impressionability and reactions of a Rhizopod and exclude the far more striking impressionability and reactions of Venus's fly-trap, and of other insectivorous plants, the recognised number of which is greatly on the increase, must be a very partial and incomplete science. If psychology is to be extended (as I think Mr. Spencer is most rational in extending it) to the whole animal kingdom, it must be made to include the vegetable kingdom also. Psychology, thus understood, will be conterminous with the whole of biology, and will embrace one aspect of organic dynamics, while physiology will embrace the other.

PHYSIOLOGY will be devoted (as it is now) to the study of the activities of tissues, of organs, and of functions, *per se*, such, *e.g.*, as the function of nutrition as exhibited in all organism from the lowest plants to man, the functions of respiration, reproduction, irritability, sensation, locomotion, &c., similarly considered, as manifested in the whole series of organic forms in which such powers may show themselves.

PSYCHOLOGY will be devoted (according to its original conception) to the study of the activities of each living creature considered as one whole—to the form, modes, and conditions of nutrition and reproduction as they may coexist in any one plant; to these, as they may coexist with sensibility and motility in any kind of animal, and finally to the coexistence of all these with rationality as in man, and to the interactions and conditions of action of all these as existing in him, and here the science which corresponds to the most narrow and restricted sense of the word, psychology, *i.e.*, the subjective psychology of introspection, will find its place.

Psychology in the widest sense of the term, in its oldest and in what I believe will be its ultimate meaning, must necessarily be, as to its details, a science of the future. For just as physiology requires as a necessary, antecedent condition, a knowledge of anatomy—since we must know that organs *exist* before we investigate what they *do*—so psychology requires as a necessary, antecedent condition, an already advanced physiology. It requires it because we must be acquainted with the various functions before we can study their synthesis and interactions.

When, however, this study has advanced, one most important result of that advance will be a knowledge, more or less complete, of the innate powers of organisms, and therefore of their laws of variation. By the acquisition of such knowledge we shall be placed in a position whence we may advance, with some prospects of success, to investigate the problem of the "origin of species"—the biological problem of our century.

This reflection leads me back once more to my starting-point, the merits of the great French naturalist of the last century, whose views as to variation and as to animal psychosis, have enabled me to bring before you the questions on which I have presumed to enter. Buffon's claims on our esteem have, I think, been too much forgotten, and I rejoice in this opportunity of paying my debt of gratitude to him by recalling them to recollection. As to the questions which his words have suggested to me and upon which I have thus most imperfectly touched, the considerations I have ventured to offer may or may not commend themselves to your approval; but, at least, they are the result of not a few years of study and reflection, and I am persuaded they have consequences directly or indirectly affecting the whole field of biological inquiry, which belief has alone induced me to make so large a call upon your patience and your indulgent kindness.

NOTES

AMONGST other lectures announced for the coming Baden-Baden meeting of the German Association of Naturalists, to which we have not referred in our note last week, we may mention that at the opening of the first general meeting on September 18, Prof. Kussmaul, of Strasburg, will deliver a memorial address in memory of the late Dr. Benedict Stilling, of Cassel, the first secretary of last year's meeting. The second and third general meetings will take place on September 20 and 24 respectively, and will be partly occupied with the following lectures:—Prof. Ecker, of Freiburg, "On Lorenz Oken, in connection with the Centenary of his Birth;" Prof. Goltz, of Strasburg, "On the Heart;" Prof. Jaeger, of Stuttgart, "On Affections of the Mind." The sectional meetings will take place on September 19, 22, and 23. For these up to the present no less than seventy-six papers have been announced, comprising all domains of natural science and medicine. The following may be of more general interest:—"On the Colour Sense among the Ancients and among Modern Uncivilised Tribes," by Prof. Hartmann, of Berlin; "On the Injurious Effects of the Refuse of Factories, specially of Bleaching Works, with regard to Fish," by Dr. Weichelt, of Rufach; "On the Physiology of the Brain," by Prof. Goltz, of Strasburg; "On Sea Climates and Sea Voyages, from a Physiological and Pathological Point of View," by Dr. Faber, of Stuttgart; "On Crimes and Insanity," by Dr. Kornfeld, of Wohlau; "Experimental Lecture on the Brain," by Prof. Rüdinger, of Munich; "On the Present State of Animal Vaccination and the Corresponding Institutions in Germany, Holland, and Belgium," by Dr. Fürst, of Leipzig.

THE Sanitary Congress and Exhibition of the Sanitary Institute of Great Britain will this year be held at Croydon. Dr. Richardson, F.R.S., has accepted the office of President of the Congress, and a large and influential committee, of which Mr. John Corry is the chairman, has been formed. The Sanitary Congress is divided into three sections, viz.:—Section 1.—Sanitary Science and Preventive Medicine; president, Alfred Carpenter, M.D., London, J.P. Section 2.—Engineering and Sanitary Construction; president, Capt. Douglas Galton, R.E., C.B., F.R.S. Section 3.—Meteorology and Geology; president, G. J. Symons, F.R.S. Arrangements have also been made for one or more lectures, one of which will be delivered by Prof. Corfield.

THE Fourth Annual General Meeting of the Mineralogical Society of Great Britain and Ireland, to receive the Report of the Council, and elect Officers for the ensuing year, and for general business, will be held at the Freemasons' Hall, Surrey Street, Sheffield, on Friday, August 22, at 3 P.M. The following papers will be read:—"On the Production of Different Secondary Forms of Crystalline Minerals," by H. C. Sorby, F.R.S.; "New Scottish Minerals," by Prof. M. F. Heddle; "On some Cornish Serpentinous Rocks," by J. H. Collins, F.G.S.

THE Fifth Annual Conference of the Cryptogamic Society of Scotland will be held at Forres, on September 17 and following days. The programme of arrangements has been garnished with several not inappropriate quotations from Shakespeare, whose "Macbeth" is naturally suggested by Forres.

DR. JOHN M'KENDRICK, Professor of the Institutes of Medicine in Glasgow University, has been appointed Lecturer in Natural Science and Theology for Session 1879-80, under the Banchory Bequest, at Aberdeen Free Church College, in succession to Dr. Lauder Brunton.

WE regret to record the death of Sir Thomas Moncreiffe of Moncreiffe, Bart., President of the Perthshire Society of Natural Science, and late President of the Cryptogamic Society of Scotland. Sir Thomas was an enthusiastic entomologist and did much to foster and promote the study of natural history in Perthshire. Amongst the schemes which he had at heart was the establishment of an efficient local museum and other aids to the promotion of the study of science in Perth. He was a frequent contributor to the pages of the *Scottish Naturalist*, among his latest contributions being a catalogue of the lepidoptera observed within one square mile at Moncreiffe, which included no less than upwards of 600 species, and is valuable for the notes on the habits and for the light thrown on the geographical distribution of the species in Britain. Sir Thomas, who was Vice-Lieutenant of Perthshire, died on August 16, in his fifty-seventh year.

The death is announced of Dr. Immanuel Hermann von Fichte, formerly Professor of Philosophy at Bonn and Tübingen Universities, and son of the celebrated Jena professor. Dr. von Fichte was born at Jena in 1797, and died at Stuttgart on August 8 last.

The fifth Russian Archæological Congress will be held at Tiflis in September, 1881, and will be specially devoted to the investigation of ancient monuments. A committee meeting will take place at Moscow in January, 1880, when the detailed programme of the Congress will be arranged.

In one of the recently submerged coal mines in the Dux district (Bohemia) a remarkable phenomenon has occurred which Dr. Braumüller, an eminent Austrian mining engineer, describes. It appears that in the subterranean waters of the "Fortschritt" mine regular tides have been observed for the last six months. Both the Berlin and the Vienna Academies of Sciences, are devoting considerable attention to the strange phenomenon. A satisfactory explanation has, however, not yet been arrived at by either.

The electric light has made its way to the highest hotel of Europe, *i.e.*, to the hotel which is situated at the greatest elevation above the sea-level. The "Engadiner Kulm" Hotel at St. Moritz, in the Upper Engadine, boasts of an elevation of 1,856 metres above the sea, and the proprietor announces that the establishment now possesses eight Jablochkoff lamps. A waterwheel is the motor of the electric machine feeding the lamps.

The National Water-Supply Exhibition was inaugurated at the Alexandra Palace last Thursday by the Lord Mayor; Mr. Chadwick, C.B., Col. Bolton, Mr. Wanklyn, Prof. Seeley, and others interested in the water-supply question, were present at the luncheon. The exhibition, which covers a wide and varied field of appliances and products in connection with the supply and uses of water, is really interesting, and ought to attract the attention of visitors. We trust it will have the educational effect hoped for. It is intended to keep it open till the spring, and as the object is to collect information as well as to spread it, it is hoped that those who have any maps, or tables referring to water-supply, will send them. Information respecting the aims of the committee may be obtained from Mr. A. T. Atchison, M.A., 34, Great George Street, Westminster. From the remarks of Mr. Cross on Mr. Fawcett's motion last week, it would seem as if Government had determined to deal with this all-important question.

The Giffard monster captive balloon burst on the 16th inst., a little before six o'clock, when a moderate wind was blowing from the south-east. It will be remembered that M. Henri Giffard placed his balloon in the hands of a company of uneducated aëronauts, who neglected to follow his advice, and for economy's sake left his balloon partly uninflated. The wind acting on the vacuum left in the lower part of the balloon, agitated the canvas in so extraordinary a manner that it gave way. It will not be restored this year, the season being too far advanced for the purpose.

The French Academy of Meteorological Ascents made two successful experiments, one at St. Germain on the 9th inst., and the other at Cambrai, to test whether it was possible to prognosticate, with the help of pilot balloons, the path which the mounted aërostat would follow. The results were satisfactory. At St. Germain the wind was very light and uncertain, but at Cambrai the velocity was forty kilometres an hour. A competent colombophile had been placed in the car, and a number of carrier-pigeons were liberated from the balloon, and a narrative of the principal incidents of the journey was posted in the city before the aërial travellers had landed. The system had been explained by M. de Fonvielle in a lecture given in the morning in the town-hall.

The correspondent of a Swiss paper warns collectors of antiquities to beware of fabricated specimens of articles purporting to belong to the age of bronze and to have been found among the remains of lake dwellings and in the beds of rivers. He says there is a regular manufactory of these things near the Lake of Bienne, and that bronze swords are being offered at 100f. each which are not worth as many centimes.

Two streams of lava flowed on the 15th from Mount Vesuvius to the base of the cone. There was no eruption on the 16th.

M. Morel Fatro, who is conducting some extensive explorations at the lacustrine station of Corcelettes, Canton Vaud, announces the discovery of a large canoe in an excellent state of preservation. It is formed of a single pine log 32 feet long and 2¾ feet wide; and though the stern is slightly damaged, the bow, which is carved and ornamented, is perfect. This interesting find will be placed in the museum of Lausanne, which now contains the richest collection of lacustrine relics in Europe.

The new part of the *Transactions* of the Asiatic Society of Japan contains much interesting matter; the most important paper, however, is one on the transliteration of the Japanese Syllabary, by Mr. Ernest M. Satow, of H.M.'s Legation at Yedo, who has industriously applied himself to the study of the language for the past eighteen years, and is one of the greatest authorities on the subject. There are also two papers worthy of notice, the one on inscriptions in Shimabara and Amakusa, and the other on the foreign travel of modern Japanese adventurers.

A party recently visiting the Daly River, North Australia, appear to have met with an alligator far larger than any hitherto seen. Nothing but the head was visible, but this is described as being about 4 feet in length and 2 feet 6 inches in width. On being fired at the monster disappeared, and the precise size of its body could not be ascertained.

In a valley at the foot of the so-called Habichtswald, near Cassel, a short distance from the castle of Wilhelmshöhe, a new ferruginous mineral spring has been discovered. The water of the new spring belongs to the class of alkaline earthy iron-waters, and besides salts of iron, contains a great quantity of carbonate of lime. It strongly resembles the Schwalbach waters both in taste and composition.

The Government of Western Australia has offered a reward for the discovery of new guano islands. Valuable deposits are believed to exist on the north coast between the Lacepedes and Camden harbour.

Mr. Wm. Hughes' "Outlines of Geology and Geological Notes of Ireland" has reached a third edition, which the author states has been almost rewritten. It contains a considerable number of illustrations. Gill and Son of Dublin are the publishers.

"The Students' Catalogue of British Plants, arranged according to the Students' Flora of the British Isles, by Sir J. D. Hooker, C.B.," is the title of a useful list compiled by the Rev. George Henslow, and published by Bateman, of Portland Town, London.

The *Proceedings* of the Bristol Naturalists' Society contains as usual several excellent papers. Mr. Stoddart's papers on the geology of the Bristol coal field are continued; Mr. Bucknall contributes a list of the fungi of the Bristol district; Dr. Fripp an account of some experiments on insect hearing; Mr. A. E.

Hudd part 2 of a catalogue of the Lepidoptera of the Bristol district.

"SCIENCE Teaching in Living Nature, a Popular Introduction to the Study of Physiological Chemistry and Sanitary Science," is the title of a little volume by Mr. W. H. Watson, F.C.S., just published by Stanford.

THE additions to the Zoological Society's Gardens during the past week include two Diana Monkeys (*Cercopithecus diana*) from West Africa, presented by Mr. F. J. Crocker; a Green Monkey (*Cercopithecus callitrichus*) from West Africa, presented by Mr. C. F. S. Day; a Malbrouch Monkey (*Cercopithecus cynosurus*) from West Africa, presented by Miss Agnes Barker; a Black Stork (*Ciconia nigra*) from Jutland, presented by Prof. J. Reinhardt, F.M.Z.S.; a Rose-crested Cockatoo (*Cacatua moluccensis*) from Moluccas, presented by Miss Foster; fourteen Golden Tench (*Tinca vulgaris*, var.), presented by Lord Walsingham, F.Z.S.; a Common Buzzard (*Buteo vulgaris*), European, deposited; two Black-footed Penguins (*Spheniscus demersus*) from South Africa, purchased; two Crested Pigeons (*Ocyphaps lophotes*), two Geoffroy's Doves (*Peristera geoffroii*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE ELONGATED NEBULÆ.—The amateur provided with an equatorial of fair aperture and a parallel-wire micrometer might do good service by the accurate determination of the angles of position of the elongated or greatly-extended nebulæ, of which so far the number of reliable measures is but small, though such objects are pretty commonly distributed. The necessity for further observations in this direction is well illustrated by the note to No. 2501 of Sir John Herschel's General Catalogue = H. I. 94; H. made the nebula by one observation extended n. to s., by another nf. to sp., while two observations by Sir John Herschel agree in making it extended in the parallel; "Surely," he remarks, "it does not rotate?" D'Arrest ("Siderum Nebulosorum") merely says: "Circa directionem axis nihil annotatum fuit."

In 1874 Mr. Cleveland Abbe called attention to this subject, and in the *American Journal of Science and Arts*, January, 1875, has collected the approximate places of about sixty elongated nebulæ from Herschel's catalogue, and has appended formulæ by which the right ascension and declination of the poles of a very much extended nebula may be calculated. These formulæ he has applied to such measures or estimations, often rough ones, of the angles of position as were then published.

THE NEW BINARY STAR τ CYGNI.—This star, the duplicity of which was detected by Mr. A. G. Clark in October, 1874, with the 26-inch object-glass manufactured for Mr. McCormick, of Chicago, well deserves following up; in the $3\frac{1}{2}$ years to 1878·4, when measures were made by Mr. Burnham, the angle of position had retrograded 25°, with but little change of distance, though a slight decrease may be suspected. The components are about 4·5 and 8. Right ascension for 1880, 21h. 10m. 8s.; declination, 37° 32′. If the motion in angle has been equable since 1874, the position may now be about 140°.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

"Report of an Unusual Phenomenon Observed at Sea"

As the unusual phenomena observed in the Persian Gulf, described in NATURE, vol. xx. p. 291, has hitherto called forth no remarks, I venture to put forward a suggestion that may be of service in elucidating the matter.

First, I would observe that the so-called parallel waves were probably arcs of large concentric circles, whose common centre lay south-south-west of H.M.S. *Vulture's* first, and east of her last, position. The distance between these positions was about a knot and a half, therefore the vessel was never nearer this centre than about half a mile, and a short arc of a circle of this radius might well be deemed straight.

The accompanying diagram, drawn from the data, shows the position of the centre of disturbance, and of the luminous waves, with relation to the course of the ship, taking the above view, which I think is borne out by the character of the second series of luminous waves through which H.M.S. *Vulture* passed.

Most living creatures possessing phosphorescence have more or less control over its display. In the case of the fire-fly, the light that one emits calls forth almost instantaneously answering flashes from others. No dweller in the tropics can have failed to observe the manner in which trees are lit up by the simultaneous flash of thousands of fire-flies, and the period of darkness that intervenes before the next flash. If then we consider the *Vulture* to have passed through a shoal (if I may so term it) of animalculæ, possessing the power of exhibiting phosphorescence intermittently, and exciting each other to do so, the impulse travelling from one to another at the rate of 125 feet a second, and the display of light to the dark interval bearing the ratio 1 to 3 (in time, $\frac{1}{5}$ of a second to $\frac{3}{5}$), we have accounted for the phenomena so far as the luminous waves are concerned.

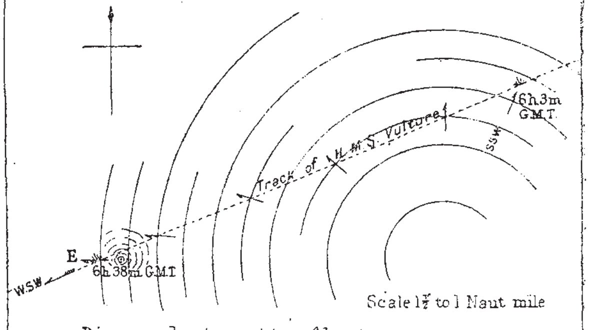

Diagram showing position of luminous wave centres

What were the central disturbances that originated the action, it is impossible to say, though it is easy to imagine several causes of irritation, that would not have been detected by the simple observations taken on board the vessel.

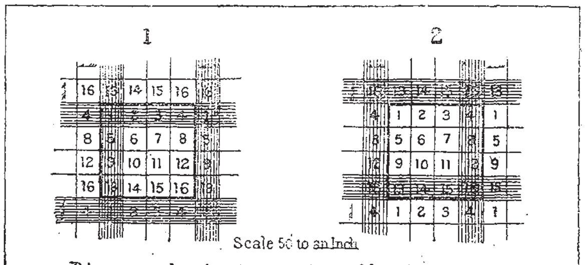

Diagram showing intersections of luminous waves.

The luminous waves of the smaller series "meeting the parallel waves from south-east did not cross, but appeared to obliterate each other at the moving point of contact." The above is difficult to explain, if the luminosity of the waves was obliterated at the actual intersections. It can however be readily shown that close to the intersections are spaces where the phosphorescence of the animalculæ would have to be displayed for twice as long a period as in other positions, and we have but to admit a want of energy to meet this call, and dark spaces will appear in each system of waves, immediately following the passage of the crossing wave.

This would certainly give the appearance of one wave obliterating the other.